Global governance/politics, climate justice & agrarian/social justice: linkages and challenges

An international colloquium
4-5 February 2016

Colloquium Paper No. 11

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Kortenaerkade 12, 2518AX, The Hague, The Netherlands

Organized jointly by:

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With funding assistance from:

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February, 2016

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Large-scale forest plantations for climate change mitigation? New frontiers of deforestation and land grabbing in Cambodia

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Abstract

The desperate search for ways to combat climate change gives rise to new mitigation policies and projects, with questionable impacts on people and the environment. Among these mitigation projects is the increasing support of large-scale 'sustainable' forestry plantations as part of the broader Clean Development Mechanisms. This paper discusses several problems that may arise from such plantation projects, especially the missed mitigation potential through the involvement of local actors in protecting biodiverse forests. It draws on an empirical case study of a 34,007ha forest reforestation project granted by the Royal Government of Cambodia (RGC) to a private Korean company. Located at the edge of the unique Prey Lang forest in an area of dense forest cover, this forest restoration project will "promote sustainable resource use" by "reducing local slash-and-burn activities" and actively "participating in Clean Development Mechanisms", according to the RGC documents.

On the ground, the forest restoration project is causing widespread deforestation through active forest clear-cutting that includes burning the vegetation after the removal of market-bound timber. First and foremost, this act of Clean Development reduces current forest carbon stocks and increases greenhouse gas emissions. Moreover, this so-called 'sustainable forestry' project comes with vast environmental and social costs, including the transformation of diverse forests to industrial monocultures, the marginalization of indigenous slash-and-burn agriculture, land grabs, and the exclusion of small-scale forest users from crucial livelihood resources. At the same time, the grassroots Prey Lang Community Network active in forest patrols to stop deforestation in the area is confronted by the legalized clearing of forests it was recently protecting. The arbitrary character of climate change mitigation policies challenges the ability of grassroots forest protection activists to do their self-appointed jobs, which they say is, "protecting the forest for themselves, their grandchildren, and for all the people of the world."

Climate justice and climate change mitigation for present and future generations will be impossible as long as large-scale industrial plantations continue to deforest vast landscapes in the name of clean development and small-scale indigenous forest users who actively protect biodiverse forests continue to be marginalized.

Keywords

Sustainable forestry; tree plantations; slash-and-burn; climate change mitigation; Cambodia; Clean Development Mechanisms (CDM) ; grassroots forest protectors; rural livelihoods; land grabbing

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1 Introduction

Forests play a relevant role in urgently needed climate change mitigation measures and promoting sustainable forest use and management in order to maintain and increase terrestrial carbon stocks takes on increasing importance. Included in the emerging debates on what such adequate forms of forest use may be, are international frameworks such as Reduction of Emissions from Deforestation and Forest Degradation (REDD+) and Afforestation and Reforestation (A/R) projects under the Clean Development Mechanisms promoting managed forest cultivation (UN-REDD 2008; UNFCC 2013). Largely excluded from these debates are more traditional forest management paradigms, such as small-scale indigenous slash-and-burn agriculture (Fox et al. 2000), which has been increasingly targeted to be banned from the list of viable options (ASB Climate Change Working Group 2000; Palm et al. 2004; Brady 1996), despite inadequate evidence of generalizable negative implications (Leisz et al. 2007; Ziegler et al. 2012; Fox et al. 2014). In this context, developers of large-scale tree plantations have become emerging partners for climate change mitigation, able to invest into and establish large-scale 'sustainable' forestry (Streck 2012; Angelsen & Wertz-Kanounnikoff 2008).

In this paper, we draw out how the justification of large-scale forestry plantations for climate change mitigation may be merely rhetorical. The social and environmental problems arising from such projects, provoked by a complex interplay between climate change mitigation narratives, land grabbing and environmental change (Hunsberger et al. 2015), however are real and of serious concern. We illustrate this with the empirical case of a 34,007ha forestry project in Kratie and Steung Traing provinces, Cambodia. The forestry concession, located at the outer boundaries of one of the biggest and most diverse tropical forests in Southeast Asia, the Prey Long forest, was granted in 2010 by the Cambodian government to the private company Think Biotech Co. Ltd. This company is a subsidiary of the Korean Hanwha Corporation, a leading producer in explosives and weapons that is recently diversifying into other industries. The concession is a 'forest restoration' project established in a region of non-degraded forest. In order for Think Biotech to restore the forest through the establishment of a production forest they must first clear the area, massively decreasing the current boundaries of the Prey Long forest. The sub-decree, issued by the Royal Cambodian Government (RCG) to establish the legal framework for the project, supports and justifies its establishment on permanent state forest reserve, among other reasons introduced in detail below, due to its role for stopping local indigenous slash-and-burn activities while becoming part of the Clean Development Mechanisms to reduce greenhouse gas emissions.

Currently, the project looks like a large-scale 'industrial slash-and-burn' landscape. It is a frontier of deforestation—of land conversion through forest clearance—that includes the burning of remaining vegetation after selective cutting of high value timber. As such, it blatantly reduces current forest carbon stocks while increasing greenhouse gas emissions, through the transformation of diverse secondary and primary forest into an industrial forest monoculture. In addition to forest clearance, the project is a frontier of land grabbing, leading to the marginalization of Kuy indigenous slash-and-burn farmers, as well as to the exclusion of previous small-scale forest users from crucial forest resources. At the same time, the grassroots Prey Lang Community Network (PLCN) active in forest patrols to stop deforestation in the area are confronted by the legalized clearing of forests they were recently protecting. Such atrocities risk alienating local grassroots forest protectors, like PLCN, and disrupting opportunities to protect forests for climate change mitigation based on local actors.

Such cases might be argued to be single cases however, there is growing evidence of other cases with similar impacts. Within this growing trend, we argue that the social and environmental problems caused by large-scale forestry plantations for climate change mitigation, are fueled by larger structural and systemic dynamics of the political, economic and institutional context of large-scale forestry in fragile states such as Cambodia. Further, we caution that similar problems will be and are being reproduced in countries under similar conditions, if they are not tackled accordingly in the current policy landscape. Moreover, they may produce large opportunity costs in terms of maintaining and enhancing diverse forest (carbon) stocks through the active involvement of local forest users patrolling the forest to protect it.

The paper proceeds as follows. The next section provides an overview on the forest concession and on the social and environmental context in which it is implemented – the Prey Lang forest area and its communities. Section 3 discusses the impacts on the ground as well as its implication for climate change mitigation. Section 4 addresses general structural and systemic problems regarding the implementation of forestry plantations for climate change mitigation in fragile countries, such as Cambodia. Section 5 concludes.

2 Forestry plantations for Clean Development: The Prey Lang Forest and the Think Biotech Ltd. concession

Cambodia has become a leader among the so-called least developed countries (LDC) in attracting projects under the Clean Development Mechanisms (CDM) (Käkönen et al. 2013). The CDM framework was established as part of the Kyoto Protocol, in order to achieve a win-win situation of reducing emissions while contributing to the sustainable development of poor nations. It was expected to provide flexibility to industrialized nations (Annex I) in reducing their carbon footprint via the purchase of Certified Emission Reduction (CER) credits in the global carbon market, while enabling developing nations (Non-Annex I) to sell CERs from green projects that at the same time would provide economic, social and environmental benefits, such new investments, green technology transfer, employment creation, tax flows, and the like (Boyd et al. 2009). In Cambodia, a series of projects with different aims, ranging from bio-energy generation to methane reduction from agriculture and waste waters, have been registered during the last years at the National Climate Change Department of the Ministry of Environment, which is Cambodia's Designated National Authority (DNA) for CDM projects. Several forest projects under REDD+ and CDM are currently under preparation or in a pilot phase (Käkönen et al. 2013).

The case presented here is a reforestation project that to the authors' knowledge has not yet formally registered as CDM project, but its applicability for CDM funds was an explicit part of government support of the project. The concession was granted to the Korean Think Biotech company, so that their activities could become *"part of Clean Development Mechanisms or other mechanisms that contribute to the reductions of greenhouse gas emissions and climate change mitigation",* according to documents of the Cambodian Ministry of Agriculture Forestry and Fisheries (MAFF 2010). Think Biotech is a company with *"Forest Resource Development"* skills and experience in Korean forestry initiatives, according to the 2010 document from Cambodia's Forest Administration (FA). Following FA recommendations, the MAFF issued a Prakas, (a ministerial proclamation) (MAFF 2010) awarding 34,007 ha to Think Biotech Co. Ltd, in partnership with the FA, to engage in "*forest restoration*" in Kratie and Steung Traing provinces. The important elements of this arrangement are first, that neither Think Biotech nor its parent company, the Hanwha Group, has any documentable experience in "*forest resource development*". The Hanwha group is rather known for its stellar performance in the manufacture of explosives, weapons, and ammunitions. Their website does cite "*new projects*" in which the company "*is dominating*". These include, *"resource and environment projects, which in keen competition (sic), such as crude oil, coal, carbon asset management, combating climate change, forest resources, etc…"* (Hanwha Group 2010). Additionally, and with grave consequences as seen in Picture 1 and in detail in the next section, this "*forest restoration*" initiative is clear-cutting vast tracts of rich forest at the edge of the Prey Lang forest.

Picture 1: Plantation development – the new 'industrial slash-and-burn' for climate change mitigation? Source: the authors. Note: This picture shows part of the 34,007ha reforestation site in Prey Lang Forest. The burned wood in the front of the picture shows evidence of the company's prior vegetation burning to clear the area, after removal of market-bound timber. The many sticks with the white piece of plastic indicate where new acacia sp. seedlings for the large-scale plantation have been planted. The remaining dense primary and secondary forest, which is increasingly lost for the establishment of the plantation, can be seen at the very horizon of the picture.

Prey Lang is a vast, but rapidly shrinking old-growth forest and one of the few remaining lowland forests in Southeast Asia. It spans upwards of 300,000 to 500,000 ha (depending on the source) at the juncture of four provinces between the Mekong and the Tonle Sap Rivers in central Cambodia. The forest is rich in biodiversity and home to many endangered species, including Asian elephants, Gibbon monkeys, and rare orchids (Hayes et al. 2015). These are but remnants, however, of the many non-human inhabitants that once thrived in the eight distinct landscapes of Prey Lang. The forest is primarily evergreen, deciduous dipterocarp and semi-evergreen, but also has large areas of mixed deciduous and pine broadleaf forests, evergreen swamps and open grasslands. There are two large rivers and many smaller tributaries and year-round water flows that travel from deep within the forest and into the Mekong and the Tonle Sap rivers. As a watershed, Prey Lang is vital for the health of Cambodia's major rivers and legendary fish production in the Tonle Sap Lake (Michaud 2013). For many thousands of years, this forest resource has fed the major rivers and supported a wide range of species from rosewood and orchids to frogs, tigers, and humans.

The humans in the forest named it Prey Lang. Prey is the Khmer word for forest and Lang is the Kuy term for ours; Prey Lang is thus Our Forest, for both Kuy and Khmer residents.[3] The people referred to as Kuy live in the region from northeastern Cambodia across southern Laos and into Northeastern Thailand (sometimes called Suoy in Thailand and Laos). Kuy people have lived in the Prey Lang region for many generations and the Kuy in Preah Vihear province claim continued habitation of their region and ancestral ties to the pre-Angkorian iron smelting sites found there, a claim not yet

[3] Some outsiders contest the Kuy designation and suggest a French origin, meaning long. We defer to the interpretation of local residents.

confirmed by so-called experts in archeology. Current Kuy population statistics in the Prey Lang region are difficult to determine, and some Kuy self-identify with dominant, more valued Khmer ethnicity. This trend is shifting amid altered values of ethnicity globally and increasing indigenous rights to claim land and resources, but the ethnic boundary between Kuy and Khmer remains fluid. In the Prey Lang region Kuy and Khmer share a long history of co-existence and similar traditions. Both groups blend Buddhist and Animist practices, and while tapping resin trees and slash-and-burn swidden agriculture are perhaps more important to Kuy livelihoods, many Khmer also use these techniques (Keating 2013; Swift 2013). Subsistence economies currently sustain over 150,000 people in the Prey Lang forest and have done so continuously for many generations (PLCN 2014).

The forest also supports state and market economic activities, and has done so intermittently for many generations. The ancient kings rose and fell, colonial extraction transformed into independent state extraction and also fell, Khmer Rouge agricultural intensification came and fell as well. The most recent wave of commercial lumber extraction began with the post-Khmer Rouge civil war years (1980-1999). State sanctioned logging of luxury timber began in the 1990s and in 1996, Cambodia's 11 million ha of forest were cited by the World Bank to be one of its *"few developmentally significant natural resources"* (World Bank et al. 1996) and vital for the transition from a command economy to market enterprises. In 1986, before opening to the global market, Cambodia exported 127,000 cubic meters of timber, by 1996 this number rose to 1,500,000 cubic meters (ibid, p. 11). In an effort to curb this dramatic increase, the government banned forest concessions and later on instituted Economic Land Concessions (ELC) for the development of large-scale agro-business. The first of these awarded in Prey Lang was Tumring Rubber, in 2007, and today, there are over 33 ELCs in Prey Lang and each one is clear-cutting forest for transformation into plantation landscapes, only a few are actually planting rubber. There is a draft sub-decree to establish the forest as a protected area (RGC 2011), but it languishes in ministerial complicity with the largely unofficial timber industry that exploded alongside plantation conversion. Current statistics on legal timber exports are not transparent, but watchdog groups recorded over 1,750,000 cubic meters of illegal luxury wood crossing into China between 2000 and 2013 (Zsombor 2015), and 153,547 cubic meters going to Vietnam in 2014 (Rollet 2015).

This extensive forest loss makes Prey Lang a key target region for Climate Change mitigation projects based on forest conservation. Although multiple key conservation organizations have presided over Cambodia's forest loss since the early years of transition to market economics, one local community group has been instrumental in combating continued deforestation. The Prey Lang Community woke up in 2002 in response to forest concession destruction and the governmental and World Bank inability to produce, when pressured by protesters, the legal codes under which concessions operated. They organized as an informal network in 2007 in response to the intensity of ELC plantation conversions (Parnell 2015). This grassroots network works both locally and nationally, organizing, meeting and strengthening the community through capacity building and patrolling the Prey Lang forest. They work to prevent freelance illegal logging in Prey Lang and to protest against the large-scale forest destruction caused by economic concession companies. Think Biotech, Co. Ltd is not officially and ELC and its status as a 'forest restoration' project in partnership with the FA allows it to claim over 3 times the legal ELC concession limit of 10,000 ha. In addition to being larger than other ELC, the Prakas that legalizes the forest restoration project of Think Biotech has particular objectives that go beyond simply converting land for market commodities.

Think Biotech in their efforts to *"restore"* the forest will also *"stop slash and burn activities, and… illegal claims of the trees…, improve soil fertility through reforestation and biodiversity conservation and reduce the utilization of natural forest by increasing the productivity of artificial forests"* (MAFF 2010). The business model of this company explicitly targets livelihood activities of the forest dependent communities described above. What is more, they make claims to improve biodiversity conservation by removing natural forest and replacing it with 'artificial forests'. All of the things that the PLCN and other forest conservation activists are fighting against are thus promoted by the Ministry of Agriculture through this company. The project's impacts on the ground and its potential for Clean Development are addressed in the next section.

3 Impacts on the ground: Land grabbing, industrial 'slash-and-burn'; deforestation, and missed mitigation potential

Cambodia's Designated National Authority (DNA) has established a series of showpiece sustainable development criteria, which must be fulfilled to register as a CDM project. These criteria cover social, environmental and economic benefits, as well as technology transfer, whereas in theory all must deliver positive performance. Practice however is far from that, and as stated by DNA staff (as cited in Käkönen et al. 2013: 54), *"even if they do not deliver in all possible ways and some contributions fall short, we still encourage the CDM projects to go forward because at least they are better than the baseline would be"*. The Think Biotech project is not yet formally registered as CDM project, but was cited as an example of steps that the government has taken "*to prevent and reduce international trafficking in illegally-harvested forest products such as timber, wildlife and other biological resources"* (UN 2014, pp.4–5). Further, representatives from the Think Biotech Co. Ltd are new members of the Technical Working Group on Forestry Reform, which is charged with the task of coordinating support between government and donors and strengthening development activities within forestry reform. Given the strong governmental support this company receives, emphasizing its CDM potential is expected, despite the ways that some of its "*contributions"* may *"fall short"*.

Granted in 2010, the company did not begin converting their land until 2013. At this time, they began to clear the land closest to where people lived, destroying the community forests, swidden agricultural lands, rice fields, and resin trees of the local community. There was no meeting held with the community in advance of these abuses and people report that the company just came and cleared the land. According to the commune chief in Kampong Cham commune where the company began operations, *"there are 150 households with approximately 400 ha of land inside the company area… this issue arose because villages did not understand about the law. When the company conducted the impact assessment, their lands were full of trees because those were shifting cultivation plots for which there was no legal recognition from the government"* (Work and Thoeun, interview, Kratie. Feb 3, 2015). The changes to local livelihoods have been dramatic and go beyond the 150 officially affected households. Families that once provided for their families amply in a subsistence economy fueled by the forest are now dependent on wage labor from the company and many have turned to illegal logging to subsidize their incomes. The company's lumber factory profoundly expands the informal logging economy and connects this forest mining operation with the deep chains of influence that connect powerful elite Cambodians and lumber brokers with disenfranchised villagers to supply the global timber market (Global Witness 2015). The loss of PLCN members to the illegal logging trade is a hardship for both those who continue to protect the forest and for those who turn to illegal logging as the last option for their families.

Think Biotech has entered into negotiations with the local community and 2,000 ha of company land was returned, but negotiations over further boundary demarcations are moving slowly amid community disputes, company stalling, and boundary transgressions to expand company logging activities, according to a PLCN meeting, held in Phnom Penh, August 7, 2015. At the time of this writing, the company is moving rapidly forward in clearing their concession area. This affects not only households within the boundaries of the concession, but all villagers of adjacent villages who lose access to the forest and their NFTPs, such as resin, herbs, rattan, mushrooms etc. They further suffer from the potential local climate effects and ecosystem alterations, such as changes in temperature, precipitation patterns and water cycles, directly associated to deforestation (Zhang et al. 1996). Accounting for all three communes in which the concession is located (Boeng Char and Kampong Cham of Kratie Province, and Siem Bouk of Steung Traing province), the number of affected people amounts to more than 13,500 (based on the 2008 population census, NIS 2008).

Much of the current landscape of Think Biotech's forest restoration project is devoid of the rich forest that once stood there, and still stands at the edge of the 'restoration'. In its place is a burnt landscape with the charred remains of low-value trees uprooted by bulldozers, and long straight rows of newly planted acacia saplings (see Picture 1). The expected 'technology transfer' seems to manifest in simply

a new ‘slash-and-burn’ practice, occurring at an entirely new scale and dimension: large-scale instead of small-scale; industrial instead of indigenous actors; corporate driven instead of culturally informed; producing permanent monocultures instead of diverse landscape mosaics. It does not even remotely resemble the ‘artificial forest’ promised in the Prakas and still described by local level officials. This is timber mining and mono-cropping plain and simple. And it comes with the massive environmental impacts associated to a change from diverse tropical primary and secondary forests into monoculture plantations (cf. Ziegler et al. 2009).

Instead of contributing to the protection of forests and maintenance of forest carbon stocks, the project is driving deforestation. Members of the PLCN describe the destruction of the forest core zone in terms of the sunshine that enters through the canopy. *“It used to be dark, shady, and cool. Now the sun shines through and we feel the heat on our heads”* (PLCN presentation, UNDP Phnom Penh, Oct. 23, 2015). This local knowledge corresponds to what becomes visible in global high resolution maps of forest change available from Hansen et al. (2013), merged with concession data available from Licadho (2015) (Figure 1). Part A of Figure 1 shows the Prey Lang forest area and its location within Cambodia. Part B shows the forest cover in the year 2000 within the concession area, 10 years prior to when it was granted. As seen, at that time the whole concession area was largely covered by dense forests (lighter green areas indicate more than 80% of forest cover; for definitions see figure caption 1). Areas with little forest cover (dark green to black shapes) were mainly located right next to the Mekong River, where human settlements have been located for decades, if not centuries. Forest loss between 2000 and 2014 (C) indicated by the red shapes occurred mostly in one area (one pixel corresponds to the area of 30m X 30m). When zooming into this area (D), it shows clearly the pattern of industrial plantation development (large red squares) organized in a grid road plan, rather than small-scale slash-and-burn agriculture. Hence, deforestation in the concession area needs to be attributed to industrial forest clearance for reforestation purposes, as ridiculous as it may sound.

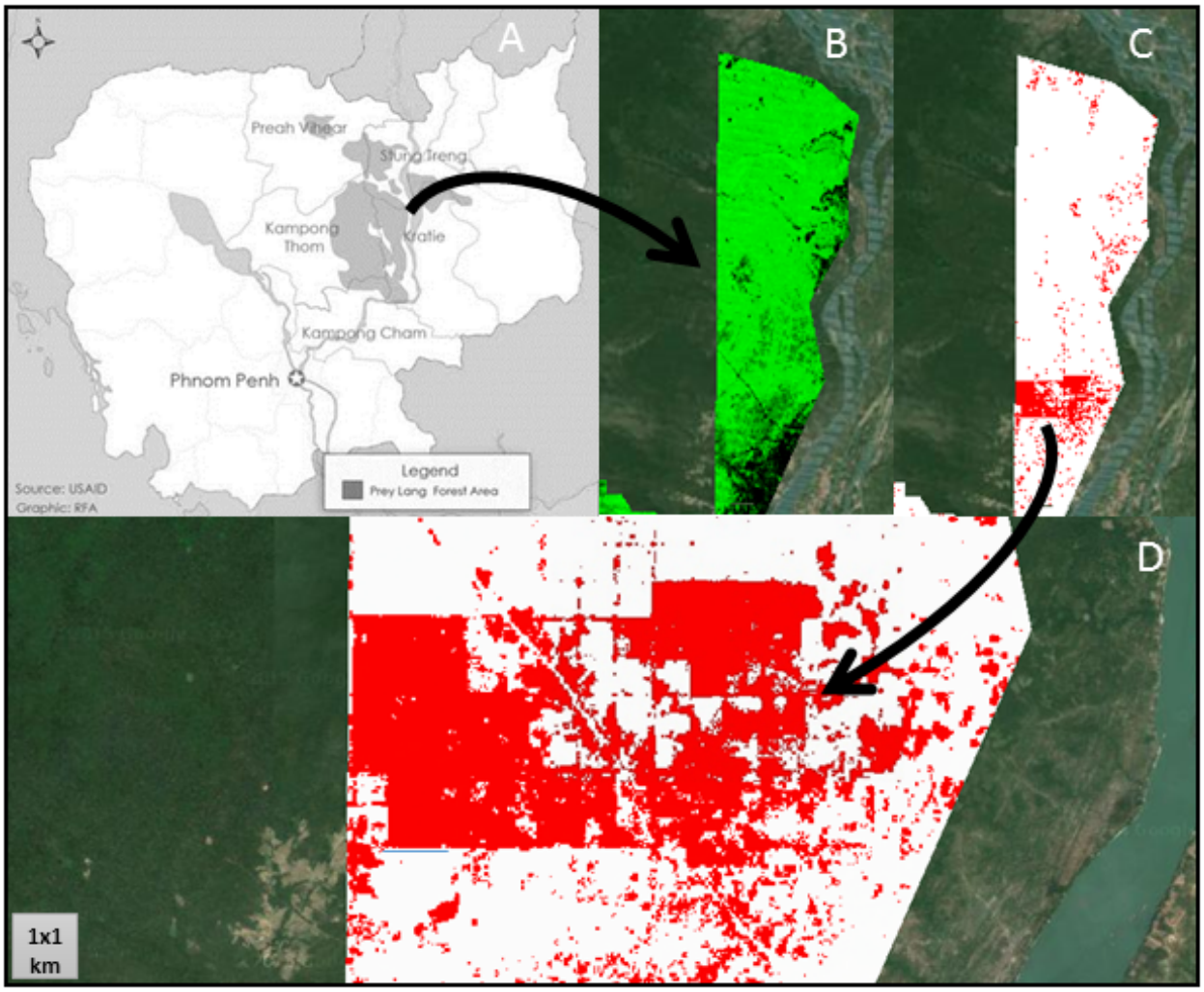

Figure 1: Deforestation in the reforestation concession area. (A) Map of Cambodia and Prey Lang Forest Area (Source: USAID); (B) Tree cover in the concession area (year 2000) located at the edge of Prey Lang; (C) Forest loss in the concession area (2000-2014) and (D) Zoom into the deforested area, showing patterns of industrial plantation development. Source: Authors' elaboration, visualized using Google Earth Engine to combine concession data from LICADHO (2015) *with forest change data from Hansen et al.* (2013). *Tree cover refers to canopy closure for all trees taller than 5m, encoded as percentage (0-100) Light green indicates more than 80% of tree cover. Forest loss refers to (ibid) "a stand-replacement disturbance, or a change from a forest to non-forest state". Red dots indicate forest loss, while white dots indicate no forest loss during 2000-2014. 1 pixel = 30x30m.*

Can the project thus contribute to Clean Development and climate change mitigation by offsetting carbon emissions? This depends on the potential to reduce emissions in comparison to its baseline, assuring 'additionality'. Additionality is a key criterion for CDM projects, which refers to the requirement that emissions are reduced below the level of greenhouse gases that would have been released without the implementation of the project (UNFCC 2013). Currently, deforestation, as seen in Figure 1, has clearly reduced carbon stocks. The question remains thus whether the plantations are able to recover not only previous stocks, but to capture additional carbon over the long-term. Tree plantations in general vary largely in terms of their carbon stocks, ranging between 82 to 462 tons/ha of Total Ecosystem Carbon (TEC, comprised of Aboveground, Belowground and Soil Organic Carbon) (Ziegler et al. 2012). Estimates for 10 year old Acacia plantations in Malaysia report between 80 and 90 tons of Carbon stocks/ha (Matsumura et al. 2008). Compare this to undisturbed natural tropical forests in general, ranging widely between 119 and 737 tons of TEC/ha (Ziegler et al. 2012), and particularly to average aboveground and belowground carbon stocks in neighboring Kratie and

Kampong Thom province, reported to amount to 474.1 and 135 Ct/ha for evergreen and seasonal forests, respectively (CIJ 2011). These values suggest a large loss of up to several hundred tons of C/ha. Moreover, it carries along real opportunity costs of enhancing forest carbon stocks based on alternative forest protection. Before the project started, forest protection, as baseline for comparison, was actively carried out by the highly organized local grassroots PLCN network, patrolling the Prey Lang forest to *"protect the forest for themselves, their grandchildren, and for all the people of the world." (*PLCN Presentation, European Union office, Phnom Penh, Oct. 19, 2015). Forest clearance in the areas they were protecting has been legalized with the reforestation project. As such, the grassroots forest protectors continue to be marginalized and unrecognized, in spite of their devoted and even 'unpaid' contribution to environmental sustainability and climate change mitigation.

4 Single cases of 'bad practice' or systemic problems of large-scale forestry in fragile countries?

It would not be uncommon for defenders of A/R CDM projects to look at our data and say that they are specific to a case that is not yet even registered, claiming that not all A/R projects have such debilitating effects. Even then, the impacts of such a single project are massive, affecting several thousand people and over 30 thousand hectares of forest ecosystems directly, requiring reflection on how CDM narratives are used to officially justify at the governmental level devastating large-scale forestry projects. While these characteristics may not apply to *all* forestry plantations set up for climate change mitigation in fragile countries[4], we can cite a growing number of such cases that corroborate our evidence (e.g. Lang 2015; Lang 2016; Olwig et al. 2016). This suggests that these are not isolated stories, but rather may underlie some common structural dynamics, some of which we address in this section.

The first issue, discussed in detail by Käkönen et al. (2013) is that Cambodia lacks the institutional, financial and technological capacity to identify, implement and monitor CDM projects over the long term. As stated by Cambodian DNA staff (cited in Käkönen et al. 2013: 54), *"…our communication with the project normally ends when we issue them the approval letter to go forward. So after that, yes maybe we can request a visit, but that's it. This is private sector you know."* This is not an isolated problem of Cambodia but rather often structural to so-called least developed countries, which chronically lack the resources and institutions inherently required to govern large-scale forestry plantations for the benefit of all citizens. For example, when Cambodia started to grant, at large scale, land concessions for agro-business and tree plantations since the turn of the millennium, it completely lacked a proper land administration system that would inform well about land use, land users and land use rights, causing massive land conflicts (Thiel 2010; Scheidel et al. 2013). Many other countries have not been able to timely develop the institutions required to govern the recent rush for large-scale plantations (Dauvergne & Neville 2010), for which reason issues related to weak governance of large-scale plantations for Clean Development can be expected to occur in other fragile states.

In addition to the lack of resources required for just and effective land governance, corruption remains an enduring and problematic issue, particularly for forest governance in fragile countries (Irland 2008). It is nourished not only by weak institutions unable to successfully govern such large-scale corporate projects for the benefit of all people, but also due to interference of drastically high-value global timber markets with dramatically low-income rural areas. Consider for example the rush for rosewood *(Dalbergia cochinchinensis)*, which is one of Cambodia's most valued but rapidly disappearing luxury timber resources. It fetches a price of up to 8,000$/m3 (Boyle 2011), which corresponds to almost 2 times the *annual* average household income in Cambodia (Baliga 2015). This massive economic discrepancy between global market dynamics and local realities creates ample space to corrupt villagers, as well as local and national government officials, in Cambodia, and elsewhere. However, this is not the only problem. The high returns from old-growth timber per unit of

[4] With fragile countries we refer here mainly to countries that are characterized by weak institutions of land governance, which may also entail political instability and lacking availability of economic resources required for effective and just land use governance.

land drives land concessions for national and multinational companies into deeply forested areas (Global Witness 2015).

Even for the hypothetical case that such projects would be implemented in absence of corruption, on truly non-forested areas with a real potential to increase terrestrial carbon stocks, such projects will likely always cause land conflicts, due to their inherent characteristics and requirements. A/R CDM projects have very large start-up costs, which is partly due to an expensive documentation, registration and validation procedure, which can mount up to 200,000$ (Thomas et al. 2010)[5], as well as due to the fact that returns upon investment are not available until the planted trees are sufficiently grown up for carbon capture and market sale, which takes at least 10-15 years. This means that only large-scale projects become viable A/R projects, able to generate sufficient surplus over time to cover initial start-up costs (Thomas et al. 2010). However, the scale of the project, which is usually financed by foreign capital and companies, requires the availability of vast tracks of 'degraded', unforested land, which is impossible to find without interfering with previous local land users. In fact, any region characterized by the ecological conditions that favor rapid forest growth would be anyway covered by natural forests or preliminary forest succession states, if there weren't a previous anthropogenic land use. The believe that such large areas of unused, unforested land exist in countries characterized by the potential for natural forest cover stems partly from the flawed perception of 'idle' and unused lands, which does not include local, extensive uses (Olwig et al. 2016; Scheidel et al. 2013), which are sometimes purposely excluded from mapping and registration procedures (Work & Thuon 2016). On the ground, such vast land concessions amounting to several tens of thousands of hectares will however always interfere either with existing forest areas - whereas the use of timber stocks turns into one way to cover start-up costs - or with human settlements and local land uses, fueling conflict over access to land.

Finally, CDM plantations impose also a monofunctional landscape value on vast land tracks, measured in terms of its emission reduction potential, while pushing back the value of diverse social and ecological landscape mosaics (Corbera 2012). In this line, also a persistent negative perception of slash-and-burn agriculture, also known as swidden agriculture, prevails, which has been fueled through decades of policies aiming at stopping it (Fox et al. 2009), backed up by global research initiatives searching for swidden alternatives (Brady 1996; Palm et al. 2004). However, recent research exposes how those initiatives lacked a nuanced understanding of the many forms of slash-and-burn agriculture and misrepresented the negative impacts that swiddening has on land use systems, which in fact are often positive for both carbon stocks as well as environmental sustainability (Fox et al. 2014; Fox et al. 2000; Kleinman et al. 1995; Ziegler et al. 2012). As long as a generalized discrimination of slash-and-burn agriculture is not overcome in science and policy, the diverse agro-forest landscapes in which swidden is practiced will continue to be perceived as degraded and target areas for CDM projects, while the indigenous communities that live on the land will continue to be marginalized. As seen in the case of this paper, all this may however come without any guaranteed benefits on emission reduction and with large social and environmental impacts.

The project benefits in terms of timber production, obtained from previous state land dedicated to now private plantations operated by (foreign) companies are generally traded away. The newly created seasonal jobs as agricultural laborers do not in any way compensate for the loss of previous livelihoods, based on self-sufficient smallholder agriculture (Scheidel et al. 2013). Some people are even pushed to illegal logging as a result of being excluded from forest and shrub land areas they were previously using. Diverse mosaic landscapes are turned into carbon monocultures, while related benefits from selling CER credits will not benefit Cambodians since the government does not consider taxation of CER revenues, which would lower their capacity to compete within the global carbon market (Käkönen et al. 2013). Such a 'race to the bottom' regarding the contribution to sustainable development is well known from other types of CDM projects (Sutter & Parreño 2007) and is further reinforced by the fact that the CDM reward only the amount of emission reduction through CER

[5] Thomas et al. (2010) argued that for this reason the registration and validation process should be simplified in order to reduce initial start-up costs. However, this would just further open the doors to 'false' CDM projects that do not meet either their expected emission reduction potential, or their expected contribution to sustainable development.

credits, but not the socio-economic and ecological consequences in target countries (Boyd et al. 2009). It thus remains truly questionable how Cambodians and citizens of other target countries can benefit from large-scale A/R CDM projects. The multiple benefits of accessing and managing forest resources for Clean Development flow mostly to a foreign company while the social and environmental impacts of large-scale plantations need to be carried by local populations of Cambodia. A least developed country, that from a perspective of 'ecological debt' (Roberts & Parks 2009), has also least contributed to causing the problem of human driven climate change.

5 Concluding remarks

In this paper we have discussed the role of forestry plantations for Clean Development in fragile countries, by drawing on a case study from Cambodia. The large forestry concession located at the borders of the unique Prey Lang forest was granted to a private Korean company and the sub-decree issued by the RGC justified the project in part, by highlighting its potential as a CDM that will enhance emissions reduction. The impacts on the ground however, have been devastating. Local communities lost community forest land, swidden plots, and rice fields, all of which were destroyed by the company igniting conflicts with authorities, the company, and with each other. Further, the large-scale deforestation at the plantation site has resulted in the drastic loss of forest carbon stocks and is causing localized climate changes, which further degrade local livelihoods. Like many other forest plantation projects that failed to bring promised mitigation benefits (Work & Woods 2016) there is currently no evidence that the 34,007ha concession can bring any benefits to climate change mitigation in the future, which turns its justification for Clean Development into a mere rhetorical element. The concrete negative impacts on the ground for people and the environment are however real and of serious concern.

We argue that the case present here is not an isolated incident caused by 'bad practices', as some may claim. We suggest rather that such single cases are the product of systemic dynamics inherently associated to the characteristics and the establishment of large-scale plantations in fragile countries. These include not only the lack of resources and experience of least developed countries required to govern successfully such projects for the benefits of all citizens, but also corruption, fueled by exorbitant profits for companies operating in environments with an economic discrepancy between high value global timber markets and low income local rural realities. Moreover, the need to generate benefits large enough to compensate for the large start-up costs rules out small forestry projects. But large-scale A/R projects in turn require vast tracks of unused, unforested land, which cannot be made available without interfering with existing forests or human settlements and local land uses, hence fueling land conflicts. Further, if the persistent negative perception of traditional slash-and-burn agriculture as degraded land use is not overcome, such projects will continuously be pushed into swidden agro-forest landscapes, at the cost of indigenous communities and the environment.

Small-scale forest users have a strong role to play in climate change mitigation, and misunderstanding the benefits their ways of life offer produces large opportunity costs. Prey Lang forest is indeed under threat of deforestation. However, as illustrated above with interviews and global forest change data, Prey Lang is not a forest degraded by local slash-and-burn activities, but rather a forest under threat by corporate illegal logging. Further, the Clean Development forestry concession we describe above was granted in an area actively protected by the highly organized, local Prey Lang Community Network. These locally organized forest protectors act not only out of a need to preserve their own livelihoods based on the collection of NFTPs – what Martinez-Alier (2002) described as the environmentalism of the poor – but also as defenders of their forests as ecological and cultural landscapes, for the present and the next generation. Being blind to their vital role in protecting forests translates into real, tangible opportunity costs for preserving diverse forests, including its carbon stocks, based on local and vocal forest defenders. Climate justice for present generations, in terms of who has to carry the social and environmental costs of mitigation measures, and climate change mitigation for future generations will be impossible as long as large-scale industrial plantations continue to deforest vast landscapes in the

name of Clean Development and small-scale indigenous forest users who actively protect biodiverse forests continue to be marginalized.

Acknowledgements

This work was funded by the Catalan government through a Beatriu de Pinós research grant [2014 BP_A 00129] as well as through the MOSAIC project, funded through NWO and DFID through the CoCooN - Conflict and Cooperation in the Management of Climate Change - Integrated Project. The authors would like to thank the members of the Prey Lang Community Network as well as the villagers visited at the boundaries of the concession area. Their inputs were crucial to inform the discussion presented here.

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